The Northwestern MILLER

MILLING PRODUCTION SECTION

A New Kansas Wheat That Could Be the Strongest in the World

By Elden Smurr

Chemist, American Flours, Inc.
Newton, Kansas

Kansas in the past had the slogan, "Kansas Grows the Best Wheat in the World." Why not the possibility of a slogan, "Kansas Grows the Strongest Wheat in the World?"

Since the time the Southwest has raised hard winter wheats, the baker has preferred "mellow gluten" that would machine better than the "harsher" spring glutens. Due to high speed mixers, with numerous additives being tossed into the doughs to get the softness and cake-like inside desired today, the bakery has found need for a Southwest hard winter wheat flour that would take more mechanical abuse in the bake shop. Because of the large amounts (25 to 50%) of "strength" wheats being used to lengthen the mixing time the flour loses the desirable features of Southwest flours of the past. Kansas for the past four years has been looking for a wheat that when used in smaller amounts (under 25%) would give a flour that would take mechanical abuse in the bake shop.

A variety of wheat long grown in Kansas, but unrecognized as to its "strength" and "gluten quality" is attracting a lot of attention among southwestern mill chemists and progressive farmers who raise hard winter wheats. In the summer of 1954 a sample of wheat from Roy Kess'er, Harvey County, Kansas, went through the usual routine checking in the laboratory of American Flours, Inc., Newton, Kansas.

The results were unbelievable. Surely a mistake had been made, for no wheat like this had ever grown in Harvey County. Checks, rechecks and triple checks always came up with the same answer—a wheat superior to spring wheat in gluten quality with the added feature that when blended with present southwestern wheat gives the desired mellow gluten quality of flours desired by the baker.

Mr. Kessler, who lives six miles south of Newton, was quickly contacted and informed of the findings and asked about the parentage of this wheat. Mr. Kessler said that he had grown this wheat for 15 years, and that it had always done well in the field, with some faults, but in his many years of raising wheat he had not yet found one wheat that was the perfect wheat. He bought the seed from a Mr. Gatz in McPherson County, Kansas. About 12 years ago, Mr. Kessler submitted a sample of this wheat to the Midland Flour Milling Co. and, after testing reported back that he should continue growing this wheat as it was a wheat the mills would like.

Seed Traced

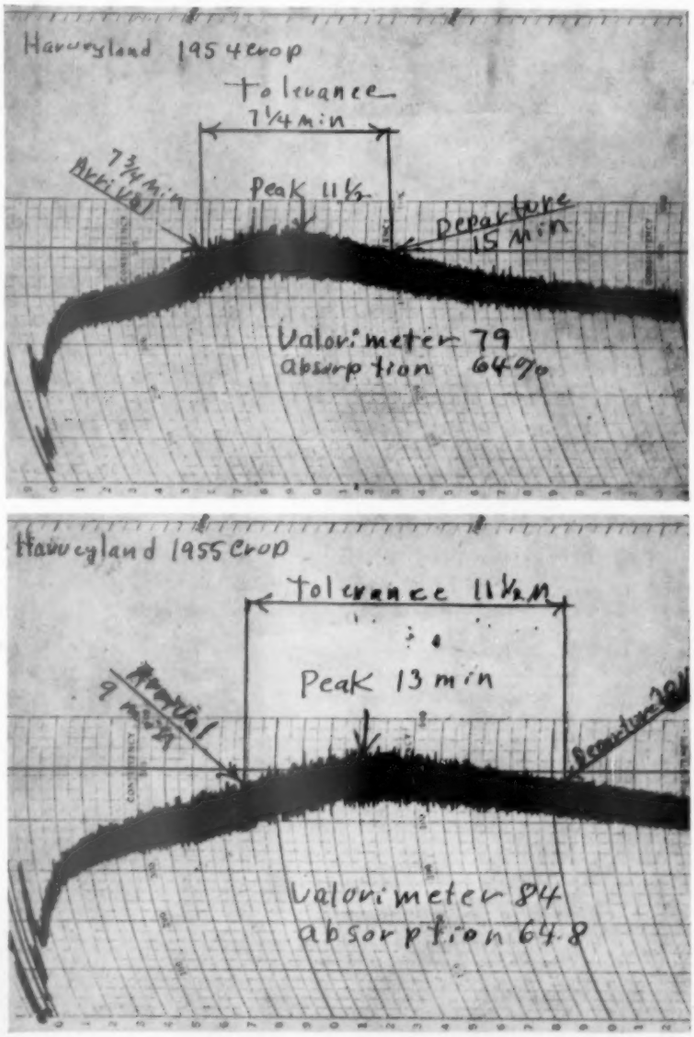
Following up each lead it was finally traced back to Dayton R. Yoder of Conway, Kansas, McPherson County. In 1932, Mr. Yoder's brother was teaching school at Sidney, Iowa. He saw this wheat and sent 1½ bu. of certified seed wheat and it was planted on the Yoder home farm near Conway, Kansas. It has been grown there each year since. Here at American Flours we call the wheat "Harveyland," coming from Harvey County, in the central part of Kansas. As yet the variety has no formal name. This name Harveyland is being applied to on'y the seed that came from Roy Kessler, in Harvey County, Kansas. Mr. Yoder refers to it as "the Iowa wheat," and has been inclined to call it "Iowin." Iowin, however, is a mellow gluten still grown in Iowa and Nebraska. In gluten strength it compares with this Kansas wheat as wou'd a glass of wine with one of straight 100 proof Kentucky bourbon.

Dr. E. G. Heyne, the agronomist from Kansas State College, on inspecting a plot of this wheat stated that it was of Turkey parentage. Mr. Shook of the Farmers Coop in Hutchinson, a very good kernel ana'ysis man, graded it 2% contaminated. This is very good for a wheat that has been grown for 32 years. Mr. Yoder, a graduate of the University of Nebraska, with a master's degree in agronomy, describes the variety as ripening three or four days later than Pawnee, a mid-maturing wheat.

It was once quite widely grown in the Monitor Church Community near McPherson, Kansas, but when custom combining became the usual thing, the farmers dropped it because the custom operators wouldn't wait for the late ripening wheat. At the same time much emphasis was being p'aced on growing Pawnee and Wichita wheats. Also, at this time Triumph wheat came into the picture and because of its earliness much ground was seeded to Triumph. These conditions all combined to push this strong wheat into the background.

This wheat is a vigorous, leafy, heavy foliage wheat that produces a heavy straw and in extremely wet years it is inclined to go down. It appears to thrive on early planting, coming up quickly and covering the ground well. The test weight is good, not as heavy as Red Chief, but considered an improvement over some of the recommended varieties. It is shatter resistant and when left in the field bleaches slowly. The variety appears to have little Hessian Fly resistance and is susceptible to leaf rust.

(Continued on page 17a)



HARVEYLAND WHEAT—These charts have been provided by Mr. Smurr to illustrate his report of a new Kansas wheat which he claims could be the strongest wheat in the world.

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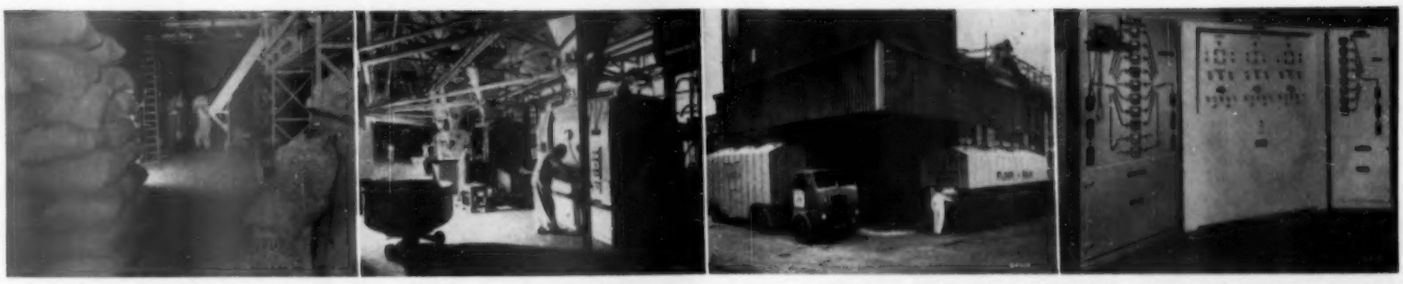


BULK HANDLING IN BRITAIN—The old flour loft at the McVitie and Price plant at Harlesden, London, has been converted into a mixing room. Flour is delivered from adjacent mills by bulk flour delivery trucks of the trailer type seen at the left of the third picture and the rigid type shown on the right. At right is pictured the nerve center of the system. The panel in the middle controls the weighing and blending of flour and wholemeal.

Production Increased, Manpower Reduced By Bulk Handling and Automation

In comparison with their counterparts in the U.S., European flour suppliers and users were slow starters in the field of bulk handling. Progress, however, is now being made, particularly in Great Britain. Combined with it is an increased trend to automation.

The British biscuit making firm of McVitie & Price, Ltd., decided in 1952 to look into the question of bulk handling and other labor saving devices for its plant at Harlesden, near London. The moving spirit was Hector Laing, a director of the firm. His idea was to take the hard work out of biscuit making. He decided that what was needed was a plant in which the intake and conveying of flour, wholemeal, sugar, as well as the mixing processes, were controlled from push buttons on a panel.

Intensive surveys of the progress made in the U.S. and elsewhere were made. Then the work of engineering the system was given to Henry Simon, Ltd., the British milling engineers.

The bulk handling installation, Mr. Laing says, has released 40 men. An increase of 60% in output has been effected by moving the mixing room to the first floor (the site of the old flour loft) and so lengthening the ovens on the ground floor. Over-all, the labor has been reduced from 2,500 (pre-war) to 700 (present-day), and output has been increased ten-fold. Even during the last five years the average production per worker has been increased from 4.6 cwts. of finished biscuits to 9.9 cwts.

Every year for the last four years, the McVitie output has shown an increase of 1% of the total tonnage of biscuits produced in Britain. This means that the McVitie production itself has risen by 35% every year during the four-year period. In 1950 the London factory sold 1½ million tins of biscuits; in 1955 this figure will be 7½ million tins.

Wastage, too, has been slashed. In 1939, 6% of finished biscuits were spoiled; this figure has been cut to 1%.

The Harlesden plant makes a contribution to dollar exports—an increasing amount of the production is selling in the U.S. In this way English millers are, indirectly, selling flour made from English-grown wheat to Americans.

Mr. Laing believes that "streamlining" and mechanization have been the main contributions to the recent outstanding success in this business. As an example of "streamlining" he gives the cut in the number of lines offered by this company: during the '30's McVities made 350 different types of biscuits; today they make only 26 and thereby achieve a greater measure of efficiency.

Bulk Flour

Several millers deliver flour in bulk to the Harlesden biscuit works and the plant has been designed to receive from bulk flour delivery vehicles of the rigid type and of the trailer type.

Intake of flour can also be by sack through a tipping hopper and a pneumatic conveying line. The stream of flour from this hopper is directed into the bulk intake line by a Simon two-way hand-operated valve. This valve can therefore be set for delivery from sack or bulk vehicle.

Wholemeal is delivered in bulk and a separate intake line has been provided. Air for discharging the wholemeal vehicle is taken from a blower which is also used as a standby for the pneumatic conveyors throughout the plant.

On the intake, the flour is distributed by a Simon multiway valve into any one of seven main storage bins. An eighth bin is used exclusively for wholemeal. The main storage bins, each with a capacity of 30 tons of flour, are of concrete construction with steel hoppers.

The flour or wholemeal is discharged from the bins by twin worm bin dischargers to an Aeroflow Conveyor. From the Aeroflow Conveyor the flour passes through a sifter and then through a Simon blowing seal, into a pneumatic-conveying line which elevates it to the service bins at the top of the silo. These service bins, of which there are eight, each has a capacity of 30 cwts. Selection of the service bin to be filled is made by a multiway valve.

Alternatively, if the flour does not meet the McVitie specification, it can be directed back to the bulk wagon.

There is a two-way valve in the air line conveying flour to the service bins so that the conveying air can be diverted to another blowing seal which is fed direct by spout from the twin worm bin discharger under the wholemeal storage bin. The wholemeal is thus delivered to a service bin, of similar dimensions to those for flour, which has been built into the nest of service bins.

Thus, with a minimum of equipment, an entirely separate system for handling wholemeal has been provided. This independent system prevents contamination of the white flour by wholemeal.

At this point in the system the batches of flour or wholemeal are weighed out for distribution to the dough mixers. The eight flour service bins are divided into two groups, each of which feeds a dial weigher. Twin worm bin dischargers are fitted to each of the service bins and aluminum alloy spouting delivers the flour to the top of the weigh bucket. There is a third dial weigher for batching the wholemeal. Two of the four service bins adjacent to the wholemeal bin have been arranged (by spouting and two-way valve) to deliver also to this wholemeal weigher. A composite batch of flour and wholemeal can, therefore, be passed to the bakery for the preparation of a digestive mix. The weighers are each capable of a maximum batch of 10 cwts.

The discharge gates of the weighers are fitted with double-acting pneumatic cylinders which are remotely controlled. The batches pass through individual hoppers under the weighers into blowing seals which feed the flour or wholemeal into pneumatic conveying lines and then through multiway valves to receiving bins over the dough mixers in the mixing room.

There are 14 receiving bins over these mixers. A valve fitted to the outlet of each receiving bin is used to control discharge of the batches into the mixers.

Air Relief and Dust Control

Dust collectors are used for air relief and the filtering of the air used in conveying.

Specially-designed filter units are fitted on the tops of the main storage bins, and the service bins. All these filters have been designed so that they shake automatically. Here, again, separate units are provided for flour and wholemeal.

On top of each receiving bin over the dough mixers is a similar unit which filters the air used for conveying the flour and sugar batches. These filters shake automatically when the valves on the outlets of the receiving bins are opened for discharge to insure that 100% of the weighment is delivered into the doughmixer.

Control Panel

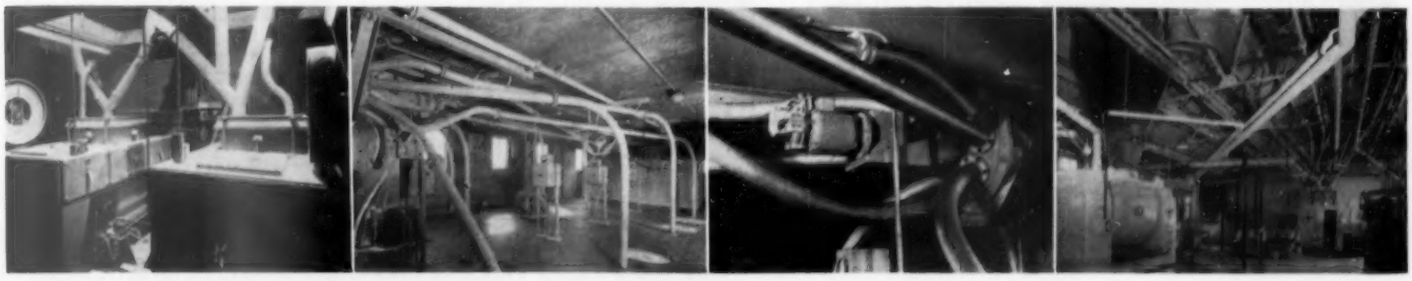
The whole of the plant is controlled remotely from electric control panels.

The control panel for the intake is situated in the basement of the silo and is used for controlling the multiway valve on intake, the compressor for sack intake, and two-way valves for directing the air to sack intake or to trailer-type bulk wagon. Indication is also given of the position of the hand-operated valve directing the flour to the bins.

This panel also has indicator meters for Telstor units which are in the main bins and which show the level of flour in any particular bin.

There is a central control room in the mixing section of the bakery and all the control panels concerned with the feeding of ingredients to the doughmixers are situated here.

The control panel for the service bins includes a mimic of the flow for that section of the plant, indicating by lights the various machines that are running. Stop and start buttons are incorporated for the equipment involved. In each of the service bins there are high and low level Tektor



AUTOMATION—The two dial weighers seen in the picture on the left are used for batching flour. On the intake, the flour is elevated to the top of the silo where a Simon multiway valve, left foreground in the second picture, passes the flour to one of the seven main bins. The third picture shows a close-up of the multiway valve. The flour passes from the hoppers under the weighers through blowing seals and then into the pneumatic line feeding the service bins over the dough mixers as illustrated in the general view on the right of the panel.

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'Pneu-Flow' can be used for smut department or mill. This shows a line of mill system cyclones.

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indicators and these are connected to lights on the bin mimic. To prevent choking of the system, the high-level indicators also stop any of the bin dischargers on the main storage bins.

There is a rotary switch in this panel for the selection of distribution by multiway valve. Both the flour and the wholemeal systems, with appropriate switches for two-way valves, are shown on this panel.

Two panels have been supplied for control and indication of the conveying systems to the receiving bins over the doughmixers. Rotary switches are used to select distribution through the multiway valves, and lights indicate which line has been selected. On the mimic of each receiving bin are two lights, which indicate whether or not a batch is held in the bin and that the valve between bin or doughmixer is open or closed. A Tektor indicator has been fitted in each of the hoppers under the weighers so that if the delivery of a batch has not been completed, indication will be given at the panel and the re-selection of the multiway valve is prevented. The controls for the blowing seals and the compressors, with running pilot lamps, are also on this panel.

Weighing Control

There is a comprehensive panel for all three weighing systems so that from this remote position an operator can select batches, control weights and observe indicators. To make this possible the dials of the weighers were specially adapted and the controls for the pneumatic discharge designed for remote operation.

There is a separate panel for the control of the sugar system. The machines are controlled by stop and start buttons with running pilot lamps. High and low level Tektors in the sugar service bin stop and start the discharge worm of the main storage bin. The pneumatically actuated valves on the weighing and batching system are electrically controlled from a single lever on this panel. Two rotary switches are used for selecting distribution lines from the multiway valves. Once again, lights indicate which line has been selected. Opposite each light is an illuminated bin mimic. Tektors are in the separate sugar compartment in the receiving bins over the doughmixers.

The electrical controls of the whole plant have been sequenced to prevent choking of the conveying lines.

The reinforced concrete silo, bins, pneumatic handling equipment, automatic proportioning and electrical controls, erection and power wiring were carried out by Henry Simon, Ltd.

After two years' operational experience Mr. Laing's comment about his plant is: "If I were to start building this installation anew, I would not alter anything."

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BELGRADE, MINN. — A moving boxcar, derailed by deep snow on a spur track, slammed into a corner of the 25,000-bu. elevator of the Merchants & Farmers Cooperative Elevator Assn. and moved the structure 6 ft. on its foundation. The elevator and all the adjoining sheds and equipment were extensively damaged. Some 6,000 bu. oats and 5,500 bu. corn in the structure have been moved to a quonset storage shed.

Warren A. Finberg

APPOINTED — Warren A. Finberg has been appointed a sales representative by Fulton Bag & Cotton Mills, Minneapolis. Mr. Finberg was educated in both grade and high schools in Minneapolis and attended the University of Minnesota. He has been active in sales work for several national manufacturers since leaving school. He is also prominent in civic affairs.

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Pneumatic Conveying in the Milling Industry

By FRITZ SCHIESS

EDITOR'S NOTE: Mr. Schiess is manager of the flour milling division of Buhler Bros., Inc., the American affiliate of Buhler Bros., the Swiss milling engineering firm. He has had considerable experience in mill construction and in the pneumatic system in various parts of the world. His talk on pneumatics was given before a meeting of members of the Northwest Section of the American Association of Cereal Chemists in Minneapolis on Feb. 24.

The main objective of milling engineers and manufacturers of milling equipment always was, and will be, to find and create new and better ways to solve the multiple problems, in close cooperation with the miller, necessary to meet new requirements.

The introduction of fully automatic milling processes emphasized the need for automatic devices in most milling and auxiliary equipment. So, in the course of the past 50 years, improved cleaning and milling machinery has been developed. This development applies also to the conventional conveying systems for mill stocks.

For example, the normal screw conveyors were replaced by chain conveyors and oscillating conveyors. Milling was improved by lessening the harmful friction of the products, and less attrition flour was produced. Higher sanitation was achieved, and less power was required.

From the old timers, only the bucket elevators remained. With the introduction of pneumatic conveying the bucket elevators also were replaced.

The conditions for using the pneumatic systems in the cleaning house are much simpler than for the mill. With a few exceptions, the capacity of each lift remains constant. According to the capacity, two types of pneumatic systems may be used: (1) The suction system, and (2) The pressure system.

Suction System

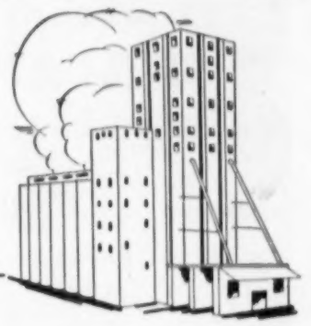
The suction system can be adapted up to a maximum capacity of 100 bu. an hour, per lift. One high pressure fan, with one motor is used. All the double cyclones are connected with one central air collecting duct from which air is blown into a suction filter, or cyclone, or even direct into the atmosphere. To maintain a constant speed of transport in each lift, special devices are built-in. By keeping this uniformity of conditions, the unit capacity power factor may be kept very low.

A. With the varying pressure in the tube, the wheat is regulated by a pneumatically controlled valve. No more material is fed into the pipe than the actual quantity of air permits, at the necessary pressure, and at a pre-determined speed.

B. On top of the system, at the air outlet from the cyclones, a second device is attached. This element is set to provide at all times a constant air volume in each lift. It is controlled by the air pressure difference in a pneumatic tube. This automatic control enables minimizing the volume of air as well as the pressure necessary to insure safe transport at reasonable speeds. It is also a safeguard when one line of the lift is out of service. When not controlled, it would influence the lift of the lines, or, in other words, without this control element a much higher pressure and consequently power consumption would be necessary for the same capacity.

C. The two safety devices are very important in case of electrical or mechanical trouble. One is the anti-choke valve, which starts the flow of grain automatically if the pipe is choked by power failure; and the motor driving the fan starts automatically. The second element is built in the double cyclone and controls the automatic air valve, or the driving motor of the blower.

Assuming that for some reason the air locks under the double separator are blocked, the wheat is accumulated above and finally would be drawn into the cyclones or blown out into the atmosphere. This element would, in this case, close the air in the line, or stop the blower motor. As soon as the valve is freed the air valve is



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NEW APPARATUS—Efficient heat removal is a principal feature of this Kjeldahl apparatus installed in the new laboratory of the Department of Flour and Feed Milling Industries at Kansas State College, Manhattan. Built by the Laboratory Construction Co., Kansas City, the apparatus has 36 units of digestion, 18 units of distillation. The entire unit is installed inside a Labconco Hood, where heat is collected and carried off by a hood blower. The sink in the center, plus facilities for storing and dispensing acid and caustic solutions, also were furnished by Laboratory Construction.

opened, or the motor starts and the flow of wheat starts again.

The pressure system is applied when capacities are high. That means from 180 bu. an hour up to 500 or 600 bu. an hour per lift. Each lifting has its own positive displacement blower with its own motor. Because of the efficiency of the positive displacement blowers the ratio of air to product can be kept much higher, the safety factor is higher, and, therefore, the power consumption can be lowered considerably. The different safety and air control units are not needed, except the one built into the double cyclones.

The main element of the pneumatic cleaning system, however, is the aspirator. Its purpose is to aspirate the wheat and separate the screenings and infested kernels. The double separator is composed of two separate units—the aspirator and the settling chamber in the form of a cyclone permitting a higher efficiency and allowing, in most cases, to exhaust the air directly into the atmosphere without additional dust collectors. Furthermore, this construction allows installing the two parts separately and so adds to the flexibility of the installation.

For many years the conveying of grain by air had been applied, but the power consumption for the transporting alone was extremely high. Only after the advance of the technology, and by introducing double separators into the same air system, could conversion from bucket elevators to air systems be justified. As a result the large fans with enormous power consumption, air ducts, cyclones, etc., could be reduced to a minimum. It has been proven by tests that wheat cleaned in a pneumatic cleaning house was cleaner than that from an elevator type cleaning house. These specific tests were made in a large mill in Holland where the cleaning house had been

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converted from a bucket elevator system to a pneumatic system. The efficiency of the cleaning house as such, that means the cleaning machines, remained the same.

The cleanliness test was made in the following way: wheat samples were taken before the first break and put in a glass of water. After one hour the water was separated from the wheat and filter. The residues were weighed. If we take 100% as the basis for the residues of the wheat separated from the water coming from a bucket elevator cleaning house, the residues coming from a pneumatic cleaning house were only 25%. We believe that this could naturally automatically affect the ash content of the flours.

Wheat Preparation

As we are on the subject of the cleaning house, I would like to say a few words regarding the preparation of the wheat. As we know, it is essential for maximum milling results to have clean wheat going to the first break roll. It is also very important to have the best moisture distribution in each kernel for the best clean separation of endosperm and bran. Besides the known procedure of cleaning wheat with the machines available on the market (separators, Carters, scourers, and, last but not least, pneumatic cleaning), a good washer is essential for the separation of stones, sand, and other heavy admixtures, but also for the separation as much as possible of infested wheat kernels by means of overflow.

The temper bins should be equipped with automatic inlets and outlets. The flow of the wheat through the bins is very important. The last wheat entering the bins should be the last to leave the bins, otherwise the tempering time varies, and the moisture distribution in the kernels is affected. Further, a de-mixing of the different qualities can be observed. The heavier wheats would leave the bins first.

It is recognized that cold tempering is necessary in order to bring the moisture content of the wheat to the level where it will produce a flour of commercially accepted moisture content. A surplus of moisture must be available in the wheat to take up the moisture loss during milling, which varies between 1 to 2%, according to climatic and milling conditions.

The purpose of tempering is not only to put the wheat up to a certain moisture ahead of the first break, but also to permit the added water to be readily absorbed by all parts of the endosperm, that means by the gluten and starch. To attain an even distribution of moisture in the wheat kernel, a tempering time of eight hours minimum is necessary. Tempering means not only to attain favorable moisture conditions for milling, but, particularly in the case of hard wheats, the mellowing of the endosperm. Considerably more time than eight hours is required for this process. When hard and soft wheats have to be milled together, the two types should be handled separately. The moisture of the soft wheat would be kept lower than in the hard wheat. The higher moisture in the hard wheat will accelerate the mellowing of the endosperm to some extent, but the time factor is still very important.

Heat Treatment

Skillful cold tempering improves the physical condition of the wheat, and good milling results may be expected. Nevertheless, the separation of the endosperm and bran is still far from perfect. With these intentions the treatment of wheat by heat was introduced. This does not mean that the cold tempering could be elimi-

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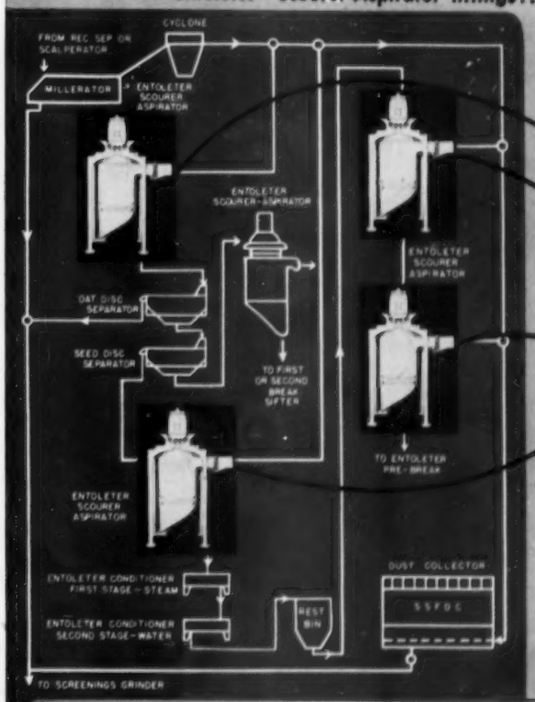

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nated. Many tests were made, and after a long period with unsatisfactory results at the start, the development of conditioners progressed, and today new machines have been on the market because there is proof that heat treatment of the wheat improves milling results if applied correctly.

It was soon recognized that cold tempering in the normal way of moisture addition, in two stages, had to precede hot treatment.

Only when moisture distribution in each kernel is complete, which occurs after 8 to 10 hours tempering time, should the heat transfer into each grain of wheat take place. The free moisture accumulated in the cell walls will diffuse into the gluten and starch cells under high pressure as a result of the temperature rise. During the heat treatment a swelling of each kernel takes place, loosening up the structure of endosperm. This process is not reversible. The heat of the wheat should be in very low temperatures, because high temperatures easily affect the extensibility of the gluten, which is not always desirable. After the heat treatment the grain has to be brought back to normal temperature.

By cold air this cooling is accomplished, and, at this stage where the transfer of heat from the inside to the outside of the kernel takes place, it is most important not to hasten this cooling process. Too great a temperature difference between the wheat and the cooling air easily results in condensation, which affects the bran coat and causes sticking of the endosperm to the bran. This can be observed in the break stocks where it is very difficult to clean up the bran.

After the cooling of the wheat a further rest of about eight hours is necessary. The temperature inside the kernels is still a little higher than the outside, and some time is needed to equalize the temperature through the kernels. During this cooling process the bran loses some moisture, and is therefore too dry for grinding. The heat transfer from the inside to the outside, during the rest period after the conditioner, transfers the moisture from the inside of the endosperm to the outside of the wheat, and it is then ready for the most favorable grinding conditions.

Pneumatics in the Mill

As mentioned before, the advance of technology, and a greater knowledge of aerodynamics, made it possible, with different types of experiments, to attain such a high standard of pneumatics for the mill, that today we can build any type of mill in any climatic conditions, and in any height above sea level. The main reasons that pneumatics now can be applied successfully are:

(a) the cyclones are so efficient (separation in the neighborhood of 99.8%) that they trap most of the stock carried by the air, thus making it possible to send practically dust-free air to the filters. ½% of filter flour is the usual figure in a pneumatic mill, compared to at least 2% of filter flour in the bucket elevator mill. This also helps to keep the yield down.

(b) The almost incredible smallness of the cyclone makes it possible to place it neatly in any available space.

(c) A greater knowledge is now available regarding designs and size of pneumatic conveying pipes. In particular, it is realized that the diameter of these pipes should be relatively small.

The different kinds of stock had to be examined in the air streams until we found the right ratio between air and product, and the right velocities. Many times the question was asked as to how the different particles of stocks changed during the conveying process. It was necessary to find out how the semolina and middlings would act as a result of the friction. In other words, is flour produced and what changes result on the surface of the different particles if the pneumatic conveying had to be used not only for normal flour mills (baking flour, spring wheat flour, soft wheat flour), but also in durum mills. In time all of these questions were answered positively, and pneumatic is used for any kind of milling production.

The beneficial effects of pneumatic handling can be summarized as follows:

(a) Most effective suction on the roller mill because the total air of transport enters the machine.

(b) The heat transmitted to the stock through grinding is absorbed largely by the air at the source of production, and the cooling takes place immediately.

(c) This cooler stock going to the sifters shows better sifting qualities, the separations are easier and more effective, therefore flour is extracted more readily.

(d) In turn the cooler stocks from the sifter to the rolls have better grinding qualities and are reduced into flour with less pressure on the rolls.

(e) The repetition of this process results in the increased capacities of machines and a decrease in maintenance costs.

(f) The sifters do a much better job, and clogging of silk and wire cloth is practically eliminated. The

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sifter also keeps clean much longer.

(g) The finished products leaving the pneumatic mill are cooler, and their storing qualities are improved. This is very important for flour bulk storage.

(h) Last but not least, infestation is reduced to a minimum throughout the mill. The cool stocks create less favorable breeding conditions, and also the breeding places, such as bucket elevators and horizontal conveyors are completely eliminated.

A big advantage of the pneumatic construction is the saving of space. In a building the possibility exists to eliminate bucket elevators thus creating more space for machines, and, therefore, the capacities can be increased with the same amount of space.

Building Costs Saved

In case of a new construction the building costs can be kept at a minimum. The building can be adapted according to the conditions. That means, that the buildings can be expanded horizontally, or reduced to a two or three floor mill.

In conversion of existing mills, most of the work necessary to remodel can be done while the plant operates, as most of the material can be installed in the free spaces—the pipes, for example, along the outside walls, the cyclones on the upper floor beside the bucket elevator heads. A short period of shutdown would allow connecting the pneumatic liftings with the machines from where the material is to be conveyed.

A main question is: "What about improved flour qualities from pneumatic mills?" No specific figures have been established, but in all instances the pneumatic mill has produced a better flour according to the bakers, who, after all, are most important. The handling of dough, and the absorption of water, seems to be improved, although, as mentioned before, no figures are available.

Through pneumatic conveying in the mill we expect a better quality of flour because less heat is produced in the endosperm. This reflects from the roll stands by cooler grinding, and we apply less pressure. The gluten quality could be improved because less heat is applied through pressure, and so the elasticity of the gluten is not influenced. This also applies in the conditioning where too high heat can have a bad effect on the wheat, and the gluten can lose its elasticity. Generally speaking, heat hurts the baking qualities of the gluten. By keeping the baking qualities of the gluten intact as much as possible reflects also to the point that wheat with lower protein could be used.

By cooler grinding we have a better sifting, and, therefore, a better separation of germs, and also of the branny particles. Therefore, we have cleaner, eventually lower ash products.

Many questions have been asked concerning pneumatic conveying. For example: How much power is required? How high is the moisture loss? What is the maintenance? With all the experience from building over 450 mills, we arrived at the point where we can keep the power very low, but it is very difficult to compare one pneumatic mill with another, or to a bucket elevator type mill.

Power Consumption

The power consumption of a mill installation is determined from the flow sheet and from the type of building. To take the power required per grinding unit of raw material and form an opinion is incorrect. The power per grinding unit per hour is equal to the total power divided between mill factor, times of grinding unit per hour. The mill factor depends on the flow sheet. If we have more, or less, passages this reflects in more or less liftings. For example, a mill can have the same capacity, but can have 20 or 30 liftings. Naturally, the mill with more lifts consumes more power. A mill with five floors needs more power than a mill with three floors.

Concerning the moisture loss, we can say that in the pneumatic mill we have about the same moisture loss, or we can call it an invisible loss, as in a bucket elevator mill, if not less. If evaporation loss is too high, the cause can be too high temperature in the products, or wrong calculation of the air quantity.

It is our belief from experiences with pneumatic mills during the past 12 years that there will be no return to the now old-fashioned bucket elevator mill. The pneumatic system has become foolproof and, therefore, practical. The better mills and the cleaner mills are pneumatic.

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RICHMOND, VA.—The Union Machinery Co., subsidiary of American Machine & Foundry Co., will consolidate its operations at the AMF plant here and close its plant at Joliet, Ill., as of July 1, it was announced Feb. 25 by John E. Morrill, Union Machinery president. Union Machinery manufactures a broad line of bread and roll mixing and makeup equipment.

The move will be made to consolidate Union Machinery's bakery machinery manufacturing operations in a location where greater expansion will be possible. The Joliet plant is located in the crowded downtown area where no expansion of present facilities is possible, Mr. Morrill noted.

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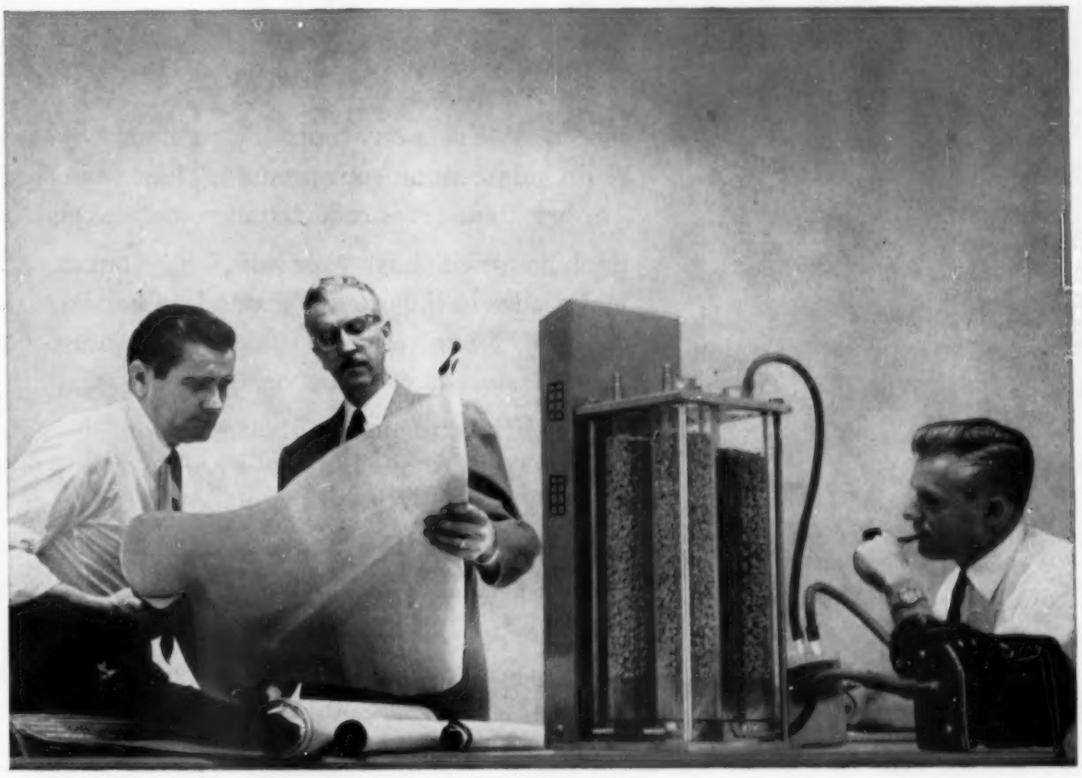

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USDA Cereal Grain Research

By K. R. Majors

I want to discuss some activities of several agencies of the U.S. Department of Agriculture which devote part of their effort to technological problems of the soft wheat milling industry from two standpoints. One is that of technical research related to the processing and use of agricultural materials. The other is that of a new program of active liaison between industries that use farm commodities and appropriate research agencies of USDA. This liaison phase is the activity I represent as a member of the Federal Extension Service staff.

Research on the technical aspects of converting agricultural materials into food and industrial products has long been one of the functions of USDA. The past 20 years, however, have brought considerably more emphasis to this part of the agricultural picture. Technical factors which affect usage of a farm commodity can have their origin in any stage of the crop's history—in the production phase, marketing or storage phase, or the processing phase. For this reason, there must be more than one research agency in the department to cope effectively with the wide range of problems encountered in bringing a crop from the ground, through marketing channels and through the plants or mills of commercial processors, on to the ultimate consumer.

EDITOR'S NOTE: The accompanying article is an excerpt from a talk given before the recent Louisville meeting of the National Soft Wheat Millers Assn. by Mr. Majors. An extension grain utilization specialist with the Federal Extension Service, U.S. Department of Agriculture, Mr. Majors is stationed at the Northern Utilization Research Branch, Peoria, Ill.

The soft wheat milling industry has the active interest and the valuable cooperation of USDA's Soft Wheat Quality Laboratory located at Wooster, Ohio.

Within the department's research organization there is another activity of similar importance to your industry carrying out investigations on cereal grains. This activity is known as utilization research and has as its broad objective the increased and more efficient use of commodities produced on U.S. farms.

Utilization research carries out its mission by finding new uses for farm commodities—by developing new or improved products from agricultural raw materials. Problems in processing techniques are studied. Processing procedures for new products are devised. Both laboratory and pilot-plant facilities as required are employed to provide data which lead to more efficient and economical processes, either by improving yield or quality of the products, or by simplifying the procedures or equipment used.

Four Laboratories

This program is carried on in four regional laboratories called utilization research branches located in four sections of the U.S. These laboratories are quite alike in several ways, such as physical structure, organization, size of staff and method of operation. The major difference lies in the commodities that are assigned to each branch for investigation. Considerable research on cereal grains is done at the Northern Branch in Peoria, Ill. Current investigations there on grain include wheat, corn, grain sorghums and oats. The Western Utilization Research Branch, located at Albany, Cal., near San Francisco, also conducts research on wheat, and includes rice on its program. Rice research is carried on also at the Southern Branch at New Orleans. The Eastern Branch, situated at Philadelphia, has not been assigned work on cereal grains.

The Peoria laboratory has a staff of around 200 technical personnel that are doing research on cereal grains, several important oilseeds, primarily soybeans and flaxseed, grass forages, and a group of crop residue materials, which are labeled agricultural residues. These residues include wheat and other cereal straws, corn cobs, sugar cane, bagasse, and similar materials.

The research staff is made up of

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chemists, biochemists, bacteriologists, chemical engineers and several other professional categories. These various specialists can be teamed up to attack effectively the different technical problems, sometimes quite complex, that are encountered in the research on the particular commodities assigned to the Northern Branch.

The wide range of new products and technical developments that can come out of a laboratory's research on a relatively limited number of agricultural materials can be illustrated by a few results and accomplishments. In the field of fermentation—which is closely related to industrial utilization of grain and grain by-products—there is the Northern Branch's development of the method for commercial production of penicillin, and of new methods for vitamins B_2 and B_{12} production; all processes are in active commercial use today.

Manufacture of industrial alcohol from wheat, whether sound or damaged—an essential process during World War II—was directly benefited by research done at the Peoria laboratory.

A commercial process for making an important medical product, dextran, which is a blood plasma expander, was worked out at the laboratory from the fermentation of simple table sugar with a bacterial organism isolated from a bottle of spoiled root beer. Corrugated container board made from wheat straw has been improved in quality and strength. These are just a few of the research results that have come from the Northern laboratory.

Wheat Work

I want now to review briefly some of the wheat work at the Western and Northern Branches, with some special mention of the Northern Branch's soft wheat research program.

Past and current utilization research programs on wheat have included problems related to the interests of millers, bakers and others in the cereal grain industry. The investigations have involved soft, semi-hard and hard wheats.

At the Western Branch in California, suitable procedures are being determined for the commercial freezing, frozen storage and thawing of bakery products. Work to date has dealt almost entirely with bread, but investigations are now being extended to sweet bakery goods.

The Western Branch's work on parboiled wheat, or bulgor, has provided information very helpful in the production and quality preservation of this food product, one which is not yet too well known in this country. Bulgor is essentially parboiled wheat which has been dried, polished to remove most of the outer bran covering, and coarsely ground. The final product retains much of the nutritional value of the whole kernel, particularly the vitamins normally lost in removal of the bran. Preparation for serving bulgor is much like that for rice but as it has its own distinctive flavor, it adds to the variety of ways that wheat can be used as a food.

At the California laboratory studies have been conducted also on wheat gluten, the major protein component of wheat. The effect of oil naturally present in the kernel on the baking properties of wheat flour has been investigated. Water-soluble constituents in the wheat flour also have been examined to find their role in baking quality. This type of information, added bit by bit to that of other research workers of the country, will help to solve the basic causes for good and poor baking qualities in the various wheats.

Research on Gluten

Research on wheat gluten is being carried on also at the Northern Branch in an effort to provide information needed not only in regard to baking properties, but also in the development of new and improved uses for wheat and wheat products. Methods are being sought for obtaining different gluten fractions from wheats of widely differing baking quality. Such methods are needed for fundamental studies of the physical and chemical structure of wheat gluten protein.

Rapid and efficient tests are being sought to estimate the extent to which wheat gluten is damaged, or denatured, by different separation procedures or other treatments. Such tests are important because it is essential to know whether the properties exhibited by various protein fractions isolated from a wheat are the native or inherent properties or are the result of changes wrought by procedures used to obtain those fractions. A study is being made of the possibility of using the powerful re-

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search tool, the infrared spectrophotometer, to aid in determining the physical and chemical structure of wheat gluten.

With considerable attention being devoted to finding more industrial uses for wheat gluten, a practical commercial process to meet an anticipated increase in gluten demand will be a major requirement. Previous research on a means of separating gluten and starch from wheat resulted in a practical method, called the batter process, which already has found considerable use in providing wheat starch and wheat gluten for industrial and feed purposes.

However, a more practical type of research is now under way. It is designed to improve the procedure by developing a more economical and efficient separation of starch and gluten from ground whole wheat and low-grade wheat flour. Current studies are providing engineering data and operating conditions for a better process.

Tests for determining milling properties of a variety of wheat at an early stage in the breeding program have been a subject of research at both the Western and Northern Branches. The California laboratory has demonstrated that milling properties of Pacific Northwest wheats are related to their content of a particular chemical constituent—a gumlike carbohydrate material. A rapid chemical test has been developed to determine how much of this material is present in small samples of wheat consisting of only three or four kernels.

Among established varieties, wheats containing relatively much of the gumlike material were found to be those difficult to mill—those which gave poor flour yields and reduced the milling capacity. Wheats containing little of the material milled quickly, with good yields of flour. This test provides a method for examining new wheat selections for milling quality very early in their development so that loss of time and effort involved in increasing selections unsuitable for milling can be avoided.

Evaluating Millability

Investigations at the Northern Branch have shown that milling quality of Pacific Northwest wheat is related also to other characteristics of the kernel which provide means of evaluating millability. Microscopic thickness of cell walls in the starchy part of the kernel is found to be related inversely to the milling quality of the variety, regardless of the year or station where grown. In other words, the thicker these cell walls, the poorer the milling quality.

A certain group of water-insoluble substances (certain hemicelluloses) were found to make up a greater amount of the material in these cell walls in excellent milling varieties than in those of poor milling quality. The thicknesses of various bran layers of a wheat kernel, measured microscopically, appeared to have no relation to the milling quality of the wheat. This series of investigations has laid the first foundation for microscopic chemical and structural studies of the wheat kernel to relate these characteristics to milling quality.

Research to determine the microscopic structure of kernels of mature hard wheat of selected varieties is under way at the Northern Branch. Photomicrographs — photographs of what you see under the microscope—that are being made of all significant findings will be made available to wheat processors and others through publications and presentations. This type of information will be similar to that on corn kernel structure provided by the laboratory to the corn processing industries several years ago. Over 3,000 individual kernels of wheat will have been studied by the time this project is completed, expected some time this year. Over 400 photomicrographs will have been recorded.

Kernel Structure

An investigation on the soft red winter wheats of the Northern Region is being initiated by the Peoria laboratory to find the relationship of wheat kernel structure to milling quality. The microscopic work for this project will be done under contract by the department of botany and plant pathology, Ohio State University, at Columbus. Differences in microscopic chemical and structural nature of the kernel will be related to differences in millability to provide the information required in developing simple methods of evaluating milling quality on very small samples.

Processes used in the wheat and corn milling industries depend upon the preferential fracture of the grain kernel along certain structural lines. Information derived from the microscopic study of details of kernel structure and chemistry may be expected

(Continued on page 18a)

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The Influence of Changing Weather Conditions on Milling

EDITOR'S NOTE: In some areas of the U.S. rather marked temperature changes occur within short periods of time, creating somewhat of a problem in milling operations. Millers facing such a problem will be interested in the accompanying article translated from the German publication "Die Muellerei."

The mills located near the North Sea in Germany observe temperatures and relative humidity of the atmosphere far more carefully than inland mills do. Caused by the tide, weather changes occur much faster —within a few hours sometimes.

The accompanying chart shows a period of changing weather and its influence on wheat tempering and milling, as observed at a large mill.

As can be seen from the chart, wheat conditioners are used for the tempering process, two conditioners for imported (hard) wheat and one conditioner for domestic (soft) wheat. The different moistures, test weights and other characteristics of the wheat ahead of the washers are not given. However, it is obvious that in spite of the continuously changing weather, the wheat moistures are rather uniform after the conditioners — this although each conditioner had to be set differently. (It has to be mentioned that the given moisture on the conditioner is in no relation to the wheat-to-rolls mix for the respective period of time.)

Cleaning and tempering of wheat are generally not as sensitive against weather changes as the milling itself. However, this means that all persons responsible for these operations have "to be on the ball" and have to know the facts and meanings of washing and tempering, the latter done either by conditioners or different tempering processes.

Following the schedules, prepared by the milling and laboratory department, failures in the preparation of wheat are very seldom. All factors such as different treatment for different wheats, weather changes, etc., must be handled with the adequate skill. The different factors can be adjusted and if necessary can be equalized.

Quick atmosphere changes show up much more in the milling process itself. Adjustments can be made by changing the moisture of the wheat to the rolls. However, by reason of suddenly changing weather conditions and technical limitation, not always full use of these possibilities can be made.

The chart shows satisfactory performance between weather and wheat to roll moisture. Maintaining the moisture standard of the flour (not to be below 15%) failed, however, at the last two readings of the chart. There, within a few hours, the temperature rose from 68 to 82° F., and the humidity dropped from 60 to 38%. The wheat to roll moisture was increased in time from 15.9 to 16.6% but was not sufficient to keep the moisture of the standard flour up to 15%.

Expecting the next change of tide, no further moisture increase was made—which turned out to be right. Furthermore, a wheat moisture of 16.8 or 17% would have affected proper grinding and would have called for a change of roll settings throughout the mill.

It has been shown quite often that it is not advisable to change the run of a mill in view of a sudden atmospheric change, especially with 150 pairs of rolls. It is more economical in these cases to wait for the next weather change and to compensate then with some higher moisture since the flour goes to bulk storage and can be blended accordingly. Thus the loss of 0.2% flour moisture can be made up easily.

Changing Weather and Its Influence on Wheat Tempering and Milling

Day	Time	Temp. °F	Rel. humidity %	Wheat to rolls %	Standard flour %	Conditioner No. 1 & 2 (imported wheat) Moisture at outlet %	Conditioner No. 3 (domestic wheat) Moisture at outlet %
8-29	3:00 p.m.	72	48	16.4	15.0	16.2	16.2
8-29	7:00 p.m.	64	64	16.4	15.0	16.4	16.3
8-30	1:00 a.m.	61	73	16.2	15.4	16.2	16.4
8-30	5:00 a.m.	57	80	16.0	15.6	16.6	15.8
8-30	9:00 a.m.	64	62	16.2	15.4	16.8	16.2
8-30	1:00 p.m.	75	45	16.2	15.2	16.2	16.4
8-30	5:00 p.m.	73	47	16.2	15.1	16.6	17.0
8-30	9:00 p.m.	66	64	16.1	15.2	16.8	16.6
8-31	1:00 a.m.	61	72	16.0	15.2	16.2	16.2
8-31	5:00 a.m.	59	76	15.8	15.2	16.2	16.2
8-31	9:00 a.m.	68	60	15.9	15.0	16.4	17.0
8-31	1:00 p.m.	81	39	16.6	14.8	16.4	Idle
8-31	5:00 p.m.	82	38	16.6	14.8	16.4	Idle

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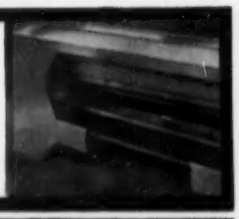

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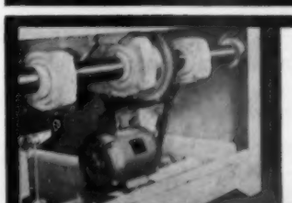

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Nail Injuries Can Be Dangerous

The control of nail injuries in the grain industry is a serious problem that demands a lot of attention not only from the management but also from every employee. An analysis of accidents in the industry shows that 10% of the accidents were caused by stepping on or striking objects, of which 7% were sharp objects such as nails.

This warning is conveyed in a report prepared for the National Safety Council by Robert L. Moore, Safety Engineering Dept., Kemper Insurance, Chicago.

The problem is one which must be attacked as soon as the boxcars are first spotted on the siding at the elevator, Mr. Moore advises. The cars may have been used to carry various kinds of commodities or equipment—and frequently are delivered with nail boards and blocking that have protruding nails.

Even though your employee may have good intentions regarding nail hazards, care must be taken to insure that blocking and nail boards will not be thrown to the ground outside the cars. It might be possible for a two-by-four to be partially concealed by a burlap bag or even by weeds.

Scrap lumber should be removed first from any regular walkway or path leading to the area where grain door boards are stored. Nails should be pulled out or the scraps carried to another area and burned. Some elevator owners regularly burn all trash, rubbish and scrap in a wire basket far enough removed from all buildings that no fire hazard is created.

An employee can unsuspectingly step on a nail board that has been carelessly thrown from a boxcar. Employees should be urged to wear shoes with good soles, and preferably shoes with safety toes.

Finally, the control of nail injuries actually is accomplished by a program of disposing of nail boards or of pulling the nails, and by a "good shoe" program pushed by management.

Remember, Mr. Moore concludes, if a nail injury does occur it is very important that first aid and tetanus shots be given. A nail injury is always dangerous since it is a puncture wound that closes immediately.

Advertisement

INSIDE SCIENCE

The Vital Story of MACARONI* ENRICHMENT

by Science Writer

This is the fourth article in a series devoted to the story of cereal enrichment

Dramatic results have been recorded about the value of enrichment in improving health. From the United States, the Bataan peninsula in the Philippines, Newfoundland and many other parts of the world comes word of the great benefits which result from enrichment.

For years, some forward-looking manufacturers of macaroni and noodle products have used enrichment to make their good foods better. They know that enrichment restores important vitamin and mineral values which are unavoidably lost in milling, and they recognize their responsibility to provide the greatest health-building benefits for the public.

Enrichment is really a simple process. It adds the following essential elements to the food during manufacture.

Thiamine—also called vitamin B_1. This vitamin helps to build physical and mental health. It is essential for normal appetite, intestinal activity and sound nerves.

Riboflavin—also called vitamin B_2. This vitamin helps to keep body tissues healthy and to maintain proper function of the eyes. It is essential for growth.

Niacin—another "B" vitamin, is needed for healthy body tissues. Its use in the American diet has done much to make a serious disease called pellagra disappear.

Iron—is a mineral used in all enrichment. It is essential for making good, red blood and preventing nutritional anemia.

Products made from semolina may be enriched by two methods. One uses small square wafers which contain all the vitamins and iron necessary to enrich 100 lbs. The wafers break up in a small amount of water which is then added to the paste. For manufacturers who use the continuous press method, a powdered concentrate of the vitamins and iron, called a premix, is available. This is added by a mechanical feeding device.

*Macaroni is used here in the generic sense. It includes all alimentary pastes: macaroni, spaghetti, pastina, noodles.

These are the minimum and maximum levels, in milligrams per pound, required by the Federal Definitions and Standards of Identity for enriched alimentary pastes.

	Min.	*Max.*
Thiamine (vitamin B_1)	4.0	5.0
Riboflavin (vitamin B_2)	1.7	2.2
Niacin	27.0	34.0
Iron	13.0	16.5

NOTE: These levels allow for 30% to 50% losses in kitchen procedures.

Nowadays scientists are able to "build" duplicates of many of Nature's essential complexes in the laboratory. This has happened with many vitamins. First the chemical composition is learned and the pure substance is isolated. Then a "duplicate" is made which is identical chemically and biologically with Nature's product. A vitamin is a vitamin regardless of its source just as salt is salt whether it comes from a mine or is evaporated from the sea. So efficient is large scale manufacturing that vitamins are sold at a lower cost than if they were extracted from natural sources.

The Hoffmann-La Roche people, who produce a good percent of the vitamins used in enrichment, use amazingly complex processes with scientific production controls. This requires modern, special equipment filling whole buildings, each one a city block square and many stories high.

The combination of scientific research, thorough know-how and mammoth manufacturing processes—plus the far-sightedness of leaders in the macaroni industry—is helping vitally to make good macaroni products better.

This article, reprints of which are available without charge, is published as a service to the macaroni industry by the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West, Montreal, Quebec.

Walter Conway

SALES MANAGER—Walter Conway has been named sales manager for the Bemis Bro. Bag Co. flexible package plant, Chicago, it has been announced by H. C. Davis, a Bemis director of operations. Mr. Conway has been with Bemis since 1945, doing sales work with national accounts in the New York general sales division. The flexible package plant, which until its recent merger with the parent company was operated as a subsidiary of Bemis, will move early in 1956 to new quarters in Terre Haute, Ind.

—BREAD IS THE STAFF OF LIFE—

Purina Sets Dividends; Elects Two Directors

ST. LOUIS — Two quarterly dividends of 75¢ a share on common stock were declared at a meeting of the Ralston Purina Co. board of directors here Feb. 20. The dividends will be payable on March 12 and June 12 to stockholders of record March 1 and June 1.

At the same time, two new directors were elected, expanding the company's board of directors to nine members. The new directors are Randolph P. Compton, partner in the firm of Kidder Peabody & Co., New York, and Harold H. Helm, board chairman and chief executive officer of the Chemical Corn Exchange Bank, also of New York. Their membership on the board will become effective at the board's June meeting.

—BREAD IS THE STAFF OF LIFE—

Winter Grain Mite

COLLEGE STATION, TEXAS — Spotted heavy populations of winter grain mite are reported in many fields of small grain in Denton, Cooke, Grayson, Fannin, Hunt, Navarro, Falls and McLennan counties in Texas.

STRONG KANSAS WHEAT

(Continued from page 1a)

The thing that impresses the writer is that these two progressive farmers have grown it, one for 32 years and the other for 15 years, and neither had any idea that it was a high gluten booster type wheat that would have at any time during the past four years carried a cash premium at any mill point. The variety is as yet unblessed by the Kansas State College although it is included in its testing operations.

First testing of this wheat was done in 1954. In 1955 a larger quality testing program was set up and at the present time it has been submitted to ten of the best mill laboratories in the southwestern hard winter wheat belt, asking that it be tested with special emphasis being laid on how it performed as a blending wheat. All reports were of the "super" variety and so enthusiastic has been the reception that they should be tempered a little with the thought that the present day need for strong gluten has made all the mills in the Southwest very conscious of strong booster type wheats. Five years ago the situation would have been entirely different.

Good Points

We have been over some of the bad points of this wheat—now to talk about some of the good points:

1. The past two years this wheat has run 13 plus in protein. On experimental milling it has milled with a low ash and good patent flour color. This is an excellent feature to have in a high protein wheat.

2. Blending properties excellent. On blending 10% of this wheat with the ordinary short mixing time southwestern hard winter wheat of 1955, it makes a noticeable difference. Twenty-five per cent makes a flour as strong as is being shipped from the Southwest this year. The present practice of blending is to select the strongest southwestern winter wheats and then to boost them with from 25 to 50% of imported wheat from Nebraska, Wyoming, South Dakota, North Dakota or anywhere you can find it. When this large percentage is used the past familiar characteristics of southwestern flours are lost in the bake shop. True, we add mixing tolerance, but we have lost the mellow gluten that made southwestern flours desirable to the baker.

3. The wheat stools flat and close to the ground. It seems to be winter hardy and seems to stand dry weather. One grower who had raised this wheat several years reported on the winter survey, "Produces well, stands hot weather and fills regard'less."

4. Harvests late. This could be the wheat to replace our present late wheats that do not bake as well as we need them to bake, and our present late wheats are also short in mixing tolerance.

5. Comes up quickly, has good ground coverage, leafy foliage, heavy straw. All of these things would help "out where the winds blow and the dust flies."

6. Good test weight, dark hard vitrous kernels, hard to bleach—things dear to any wheat farmer's heart (and pocketbook).

7. Fifteen per cent seeded acreage plus what good wheats we have would make a decided improvement by allowing mills to boost their mill mixes with Kansas wheat instead of out-of-state wheats that carry a transit penalty.

Seed Distributed

The present program has been to distribute the seed wheat to 53 growers located from Tripp County, South Dakota, to Whitewater, Kansas, to Waketa, Okla., in the south and as far west as Garden City. These seedings are on a limited scale. Each grower has been contacted on a winter survey (see accompanying illustration) and this spring another survey will be made and after harvest samples collected and again be

Date.....Color of plant: green.....brown.....

Crop preceding.....Date of seeding.....

Your telephone number.....Soil moisture at time of seeding.....

Did HARVEYLAND stool flat.....No. of acres seeded.....

Did it set both top and secondary roots.....

How does it compare with other wheats.....

Did it have enough fall growth to prevent wind erosion.....

On summer fallow or continuous crop land.....

Amount seeded per acre.....

Field location.....Type of soil.....

Would you in the future send us a one ounce sample of this soil.....

Comments (both good and bad).....

SURVEY—Growers of Harveyland seed were subjected to a searching survey. Illustrated is the card used to obtain detailed information.

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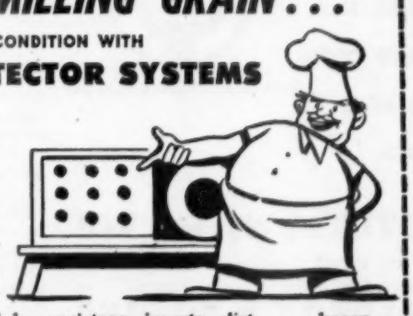

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checked for gluten quality and mixing tolerance.

This whole project has been pushed by Murray Ross, president of American Flours, Inc. He has enlisted the aid of several friends to find out more about this wheat, and after the wheat harvest this summer and the testing has been completed, and the winter surveys studied, much more will be known about this Harveyland variety of wheat. Should the highly dramatic results of the past two years be substantiated, as Mr. Ross aptly puts it, "It is like rescuing a great old bull from the stock yards."

This article is not being written with the idea of trying to sell the mills on this wheat. All mills over the country are conscious of the qualities desired by the baker. This is merely a summary of one small project to try and bring up needs of more mechanical tolerance in southwestern wheat and retain the desirable characteristics liked by the baker.

The immediate problem is to gather quickly information on the field characteristics of this wheat and if it is possible make this parentage available for future wheats in the years ahead.

Some of our present wheat needs an added boost to "Make Friends and Influence Bakers" and to put Kansas at the top in wheat quality. Surely with all our good varieties such as Ponca, Triumph, Comanche, and Concho some cross could be worked out to eliminate the present weakness of Harveyland wheat and to retain a large proportion of its high gluten quality and long mixing tolerance.

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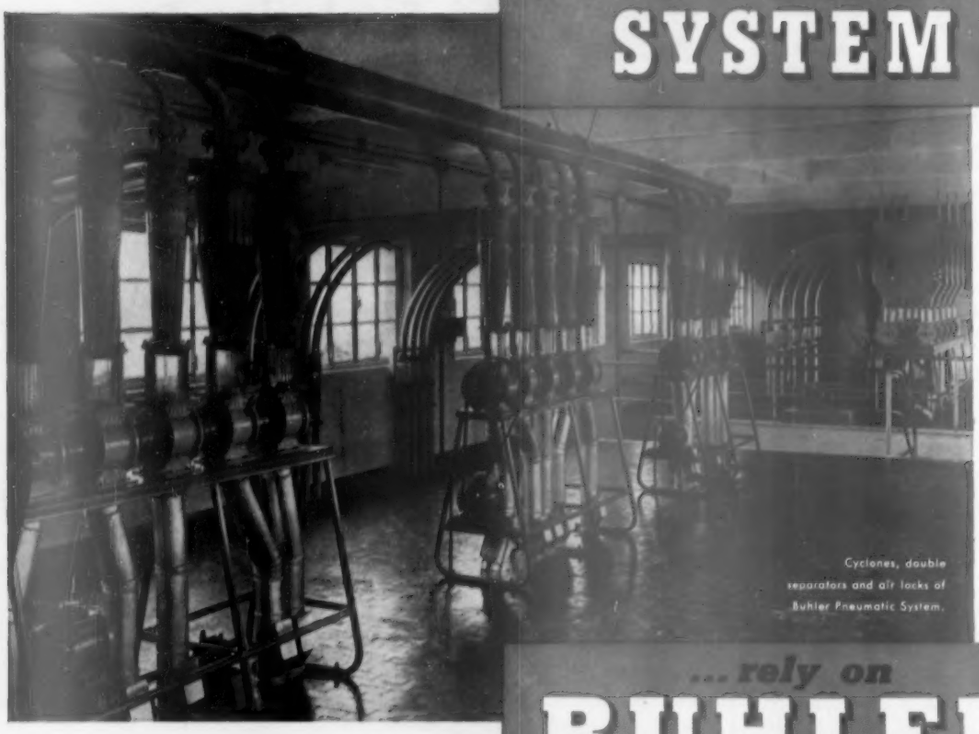

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USDA RESEARCH

(Continued from page 14a)

to provide the basis for new milling machinery and new milling techniques. Such changes would be expedited when founded on an intimate knowledge of the kernel structure. Milling operations, including tempering, can be improved on a scientific rather than empirical basis when dependence of the operation on kernel structure or composition is better understood.

Of importance to wheat millers is the question of ash content of flour. The baking industry uses ash content in its flour specifications to insure receiving flour of the desired grade, or per cent extraction. The miller knows that flours of the same extraction may differ widely in ash content because of initial differences in mineral content of the wheats. Some cereal chemists have found that distribution of minerals within the kernel may vary.

Research has been started at the Northern Branch to develop a simple, rapid laboratory method for the direct determination of bran in wheat flour as a means of indicating milling efficiency. Results from a new test will be compared with those of the present official ash determination, and the relative merits of the two tests as reliable methods for indicating extraction will be established.

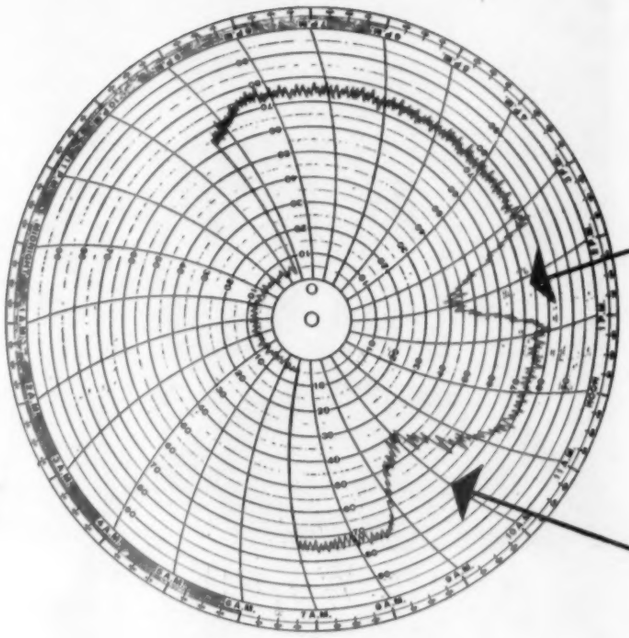
From my foregoing discussion of the Northern Branch's wheat research projects you will have gained a general idea of some of the research facilities at the Peoria laboratory that can be brought to bear on problems of wheat milling. A few more can be enumerated. Besides the usual grain cleaning, grading and sampling equipment, including a barley pearler for determining pearling index, the laboratory has a Buhler-type experimental flour mill and a well-equipped baking laboratory.

Extension Service

Up to this point I have been speaking of utilization research to develop new and improved uses for wheat. Although there are other activities of USDA that contribute to the technical advancement of the grain processing industries which could well be mentioned, I want to add a few words now about the part the Federal Extension Service plays in this field as a member of the USDA team.

This agency has initiated a new, positive program of disseminating information dealing with USDA's technical developments in grain and certain other commodities direct to appropriate industrial and processing groups. As a sort of liaison representative in the field of cereal grain utilization, I am responsible for assisting in bringing about a more rapid and widespread awareness in the grain processing industries to useful technical findings derived from research at the Peoria laboratory.

Another important part of this utilization extension work is to help utilization research agencies to be alert to research needs of the grain processing industries. By increasing contacts with these industrial groups and with the various state agencies, particularly the state agricultural experiment stations and the state extension services, it is hoped that the more pressing problems of industries using grain or grain products as raw materials may be recognized earlier and the utilization research program on grains adjusted more promptly and effectively to the solution of these problems.



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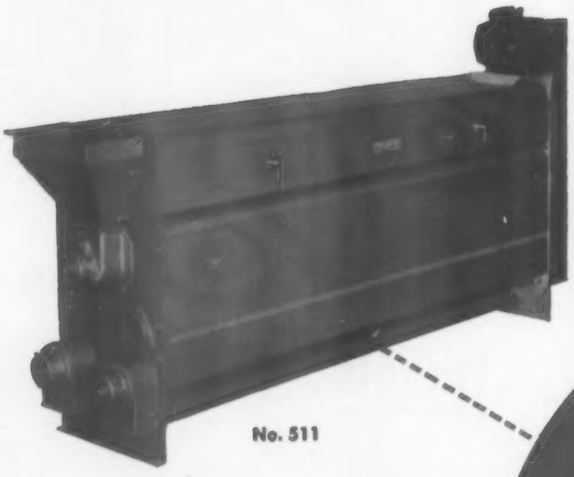

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